

Applicant: Vorozhtsov et al.
Application No.: 10/540,948

Amendments to Drawings:

The attached seven (7) sheets of drawings includes changes to Figs. 2 - 15. These sheets, which include Figs. 2 - 15 replace the original sheets including Figs. 2 – 15. The drawings submitted are clear and reproducible. Withdrawal of the objection to the drawings is respectfully requested.

REMARKS/ARGUMENTS

After the foregoing Amendment, Claims 1 – 11 are currently pending in this application. Claims 1-11 have been amended. In the drawings, Figures 2 - 15 have been replaced with clear and reproducible drawings. Applicants submit that no new matter has been introduced into the application by these amendments.

Objections to the Drawings

The Examiner objected to the drawings because Figures 2 – 15 are distorted and unsuitable for reproduction. Replacement sheets including Figures 2 - 15, which are clear and reproducible, are submitted herewith. The withdrawal of the objection to the drawings is respectfully requested.

Claim Objections

The Examiner objected to claim 11 due to informalities. Claim 11 has been amended to cure the informalities. The amendments to the claim render the objection moot. The withdrawal of the objection to claim 11 is respectfully requested.

Claim Rejections - 35 USC §112

Claims 1 – 4, 7 and 10 – 11 were rejected under 35 U.S.C. §112, second paragraph due to informalities. Claims 1 – 4, 7 and 10 – 11 have been amended to

cure the defects. Based on the arguments presented above, withdrawal of the Section 112, second paragraph, rejection of claims 1 – 4, 7 and 10 – 11 is respectfully requested.

Claim Rejections - 35 USC §101

Claims 1-4 and 11 were rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Specifically, claims 1 and 11 merely recite a method without reference to a particular machine or apparatus, or the demonstration of a transformation into a different article.

Claims 1 and 11 are amended such that the recording of the trajectories of the infrared footmarks is performed by an infrared camera and dynamic changes of the trajectories of the infrared footmarks are analyzed with a computer. Therefore, the claimed invention is tied to a machine or apparatus, (i.e., camera, computer).

Based on the amendments and arguments presented above, withdrawal of the § 101 rejection of claims 1 – 4 and 11 is respectfully requested.

Claim Rejections - 35 USC §102(e) and §103(a)

Claims 1-2, 5-6 and 10-11 were rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 7,094,164 to Marty et al. (hereinafter “Marty”). Claims 3 and 4 were rejected under 35 U.S.C. §102(e) as anticipated by, or in the alternative, under 35 U.S.C. §103(a) as obvious over Marty. Claims 7 and 8 were

rejected under 35 U.S.C. §103(a) as obvious over Marty in view of U.S. Patent No. 5,342,054 to Chang et al. Claim 9 was rejected as obvious over Marty in view of U.S. Patent No. 5,231,483 to Sieber et al.

With respect to claim 1, Marty fails to disclose recording, by an infrared camera operating in an infrared range of 3-12 μm , trajectories of infrared footmarks resulting from an interaction of the object with a surrounding object or a surrounding environment.

Marty discloses a method for tracking flight of a basketball using a system comprising video cameras and subsequent mathematical processing of the captured video record by a computer. In Marty, the infrared camera is used for detecting a reflected light emitted by a light source placed on a basketball backboard. Marty also uses optical filters for removing visible lights, which results in recording a ball image in the near infrared range, (i.e., with wavelength of 800-900 nm).

In accordance with claim 1, the dynamic parameters of movement of an object is obtained by capturing the movement of the object in an infrared spectral range, in which the trajectory of the infrared footmarks formed as a result of an interaction of the object with a surrounding object or environment. For example, in tennis, the infrared footmarks may be formed as a result of an impact to a ball by a racket or with a surface of the court; (see paragraph 0016). The infrared footmark may have a positive value if it results from inelastic impingement of two objects, and in this case the temperature of the contact area would be higher than that of surrounding

bodies or parts of the object; (see paragraph 0013). The captured infrared footmarks are thermal changes in the place of an impact of a ball, (for example, with the court surface), wherein the thermal footmark remains for some time period both on the court surface and on the ball surface. In contrast, Marty merely discloses detecting infrared reflected from the basketball, but fails to disclose capturing the thermal footmarks generated by an interaction of the object with a surrounding object or environment.

In accordance with claim 1, the trajectory of these footmarks are captured by the infrared cameras operating in a middle infrared range – between 3,000 and 12,000 nm. This spectral range is the optimal wavelengths for registering thermal changes owing to impacts of two objects. In contrast, Marty fails to disclose any specific spectral range for capturing the footmarks. Marty discloses filtering the visible light from the detected lights resulting in recording a basketball image in the near infrared range.

Marty fails to disclose detecting thermal footmarks formed as a result of an impact of the object with the surrounding objects for reconstruction of an object movement trajectory and capturing trajectories of infrared footmarks in an infrared range of 3-12 μm . Therefore, claim 1 and its dependent claims are neither anticipated by, nor obvious over, Marty.

Claim 11 includes similar limitations as claim 1. Therefore, it is believed that claim 11 is neither anticipated by, nor obvious over, Marty for at least the reasons stated above.

With respect to claim 5, Marty fails to disclose an apparatus including an infrared camera operating in an infrared range of 3-12 μm , and a mechanical oscillation receiver connected to the infrared camera and intended to run and stop the infrared camera and a computer. For example, in tennis, the mechanical oscillation receiver detects the sound from the racket striking the ball and opens or closes the infrared cameras. The mechanical oscillation receiver is used to reduce the amount of data to be processed by automatically opening or closing the infrared camera and accelerate outputting on video displays the frames illustrating the contact of the ball with the court and parameters of the ball trajectory; (see paragraph 0041). This is not disclosed in Marty.

In addition, as presented above, Marty fails to disclose capturing trajectories of infrared footmarks in an infrared range of 3-12 μm . Therefore, claim 5 and its dependent claims are neither anticipated by, nor obvious over, Marty.

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Conclusion

If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, or that a telephone interview will help to materially advance the prosecution of this application, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1 – 11 is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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